WHAT IS CLAIMED IS:

1. A semiconductor device, comprising:

a substrate; and

a MISFET including source-drain regions formed in the substrate, a gate insulating film formed on the substrate, and a gate electrode formed on the gate insulating film ,the gate insulating film comprising a metal oxynitride film containing a metal-oxygen-nitrogen bond chain.

2. The semiconductor device according to claim 1, wherein the metal contained in the gate insulating film includes at least one element selected from the group consisting of Zr, Hf, Ti and a lanthanoide metal.

3. The semiconductor device according to claim 1, wherein the nitrogen concentration in the gate insulating film falls within a range of between 15 atomic % and 30 atomic %.

4. A semiconductor device, comprising:

a substrate; and

a MISFET including source-drain regions formed in the substrate, a gate insulating film on the substrate and a gate electrode formed on the gate insulating film, the gate insulating film comprising a nitrided metal silicate film containing one of a metal-oxygen-nitrogen bond chain and a silicon-oxygen nitrogen bond chain.

5. The semiconductor device according to claim 4,

wherein the metal contained in the gate insulating film includes at least one element selected from the group consisting of Zr, Hf, Ti and a lanthanoide metal.

6. The semiconductor device according to claim 4, wherein the nitrogen concentration in the gate insulating film falls within a range of between 15 atomic % and 30 atomic %.

7. A method of manufacturing a semiconductor device, comprising:

forming a metal oxide film on a substrate;

applying a heat treatment to the metal oxide film under temperature falling within a range of between 700℃ and 900℃;

adding nitrogen to the metal oxide film after the heat treatment by using nitrogen under an excited state so as to obtain a gate insulating film consisting of a metal oxynitride film containing a metal-oxygen-nitrogen bond chain; and

forming a gate electrode on the gate insulating film.

8. The method for manufacturing a semiconductor device according to claim 7, further comprising applying a heat treatment to the gate insulating film under an oxygen partial pressure of 1×10^{-3} Torr or less, before forming the gate electrode.

9. The method for manufacturing a semiconductor device according to claim 7, wherein forming the gate

electrode is continuously carried out under vacuum after deposition of the gate insulating film without exposing the gate electrode to the air atmosphere.

10. The method for manufacturing a semiconductor device according to claim 7, wherein the metal contained in the gate insulating film includes at least one element selected from the group consisting of Zr, Hf, Ti and a lanthanoide metal.

11. A method of manufacturing a semiconductor device, comprising:

forming a metal silicate film on a substrate;

applying a heat treatment to the metal silicate film under temperature falling within a range of between 700℃ and 900℃;

adding nitrogen to the metal silicate film after the heat treatment by using nitrogen under an excited state so as to obtain a gate insulating film consisting of a nitrided metal silicate film containing at least one of a metal-oxygen-nitrogen bond chain and a silicon-oxygen-nitrogen bond chain; and

forming a gate electrode on the gate insulating film.

12. The method for manufacturing a semiconductor device according to claim 11, further comprising applying a heat treatment to the gate insulating film under an oxygen partial pressure of 1×10^{-3} Torr or less before forming the gate electrode.

13. The method for manufacturing a semiconductor device according to claim 11, wherein forming the gate electrode is continuously carried out under vacuum after deposition of the gate insulating film without exposing the gate electrode to the air atmosphere.

14. The method for manufacturing a semiconductor device according to claim 11, wherein the metal contained in the gate insulating film includes at least one element selected from the group consisting of Zr, Hf, Ti and a lanthanoide metal.

15. A method of manufacturing a semiconductor device, comprising:

forming by a CVD method on a substrate a gate insulating film consisting of a metal oxynitride film having a metal-oxygen-nitrogen bond chain, the CVD method being carried out in the presence of nitrogen under an excited state; and

forming a gate electrode on the gate insulating film.

16. The method for manufacturing a semiconductor device according to claim 15, further comprising applying a heat treatment to the gate insulating film under an oxygen partial pressure of 1×10^{-3} Torr or less, before forming the gate electrode.

17. The method for manufacturing a semiconductor device according to claim 15, wherein forming the gate electrode is continuously carried out under vacuum

after deposition of the gate insulating film without exposing the gate electrode to the air atmosphere.

18. The method for manufacturing a semiconductor device according to claim 15, wherein the metal contained in the gate insulating film includes at least one element selected from the group consisting of Zr, Hf, Ti and a lanthanoide metal.

19. A method of manufacturing a semiconductor device, comprising:

forming by a CVD method on a substrate a gate insulating film consisting of a nitrided metal silicate film having at least one of a metal-oxygen-nitrogen bond chain and a silicon-oxygen-nitrogen bond chain, the CVD method being carried out in the presence of nitrogen under an excited state; and

forming a gate electrode on the gate insulating film.

20. The method for manufacturing a semiconductor device according to claim 19, further comprising applying a heat treatment to the gate insulating film under an oxygen partial pressure of 1×10^{-3} Torr or more, before forming the gate electrode.

21. The method for manufacturing a semiconductor device according to claim 19, wherein forming the gate electrode is continuously carried out under vacuum after deposition of the gate insulating film without exposing the gate electrode to the air atmosphere.

22. The method for manufacturing a semiconductor device according to claim 19, wherein the metal contained in the gate insulating film includes at least one element selected from the group consisting of Zr, Hf, Ti and a lanthanoide metal.

23. A semiconductor device, comprising:

a substrate; and

a MISFET including source-drain regions formed in the substrate, a gate insulating film formed on the substrate, and a gate electrode formed on the gate insulating film , the gate insulating film comprising a metal oxynitride film, the metal oxynitride film consisting of metal, oxygen and nitrogen, and the metal oxynitride film having peaks of binding energy corresponding to a metal-oxygen bond and a oxygen-nitrogen bond.

24. A semiconductor device, comprising:

a substrate; and

a MISFET including source-drain regions formed in the substrate, a gate insulating film formed on the substrate, and a gate electrode formed on the gate insulating film, the gate insulating film comprising a nitride metal silicate film, the nitride metal silicate film consisting of metal, oxygen, nitrogen and silicon, and the nitride metal silicate film having peaks of binding energy corresponding to a oxygen-nitride bond and a silicon-nitrogen bond.